Application of behaviour models in BEPS and control

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Occupants' interactions with the building envelope and building systems can have a large impact on the indoor environment and energy consumption in a building. As a consequence, any realistic forecast of building performance must include realistic models of the occupants' interactions with the building controls (windows, thermostats, solar shading etc.).

During the last decade, studies about stochastic models of occupants' behaviour in relation to control of the indoor environment have been published. Often the overall aim of these models is to enable more reliable predictions of building performance using building energy performance simulations (BEPS). Many of these models predict the probability of an event (e.g. window opening, light switching, heating set-point adjustments and so on) as a function of indoor and outdoor conditions and are meant for stochastic simulations in BEPS. These models provide new opportunities for testing robustness of different designs towards differences in occupants' behaviour patterns. However, many questions remain unanswered with regard to construction and application of realistic models of occupants' interactions with building controls and building envelope.

The present contribution will explore a number of these questions:

Choosing the right model:

- Stochastic vs. deterministic models: Finding models that fit the purpose?
- Model formulations - consequences for the implementation in BEPS

Application of occupant behaviour models in BEPS

- Implementation of occupant behaviour modes in BEPS – exemplified with a case study.
- Verification of occupant behaviour models – Do the models produce reliable results?